

Test Report

FOR: **ezoBord**
Elgin, IL

Sound Absorption
RAL-A18-331

CONDUCTED: 2018-10-03

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ON: Ceiling Baffle system 2 in. (50 mm) Rombo/Nelio

TEST METHOD

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2005 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM C423-17: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-16: "Standard Practices for Mounting Test Specimens During Sound Absorption Tests." A description of the measuring procedure and room qualifications is available upon request.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as Ceiling Baffle system 2 in. (50 mm) Rombo/Nelio. A full internal inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

Baffles

Material: Polyethylene terephthalate
Dimensions: 9 @ 2409.82 mm (94.875 in.) x 196.85 mm (7.75 in.)
Composition: Two panels per baffle @ 9.4 mm (0.37 in.) thick each
36.83 mm (1.45 in.) thick space between panels
Overall Weight: 12.36 kg (27.25 lbs)

Mounting Rails

Material: Metal
Dimensions: 3 @ 2457.45 mm (96.75 in.) x 44.45 mm (1.75 in.)
Thickness: 23.88 mm (0.94 in.)
Installation: Hung from test chamber cable array, spaced 609.6 mm (24 in.) on center
Baffles mounted perpendicular to rails via matching cutouts
Overall Weight: Rails @ 2.72 kg (6 lbs)
Additional mounting hardware (cables, ties) @ 0.23 kg (0.5 lbs)

Spacers

Material: Polyethylene terephthalate
Dimensions: 48 @ 247.65 mm (9.75 in.) x 44.45 mm (1.75 in.)
Thickness: 9.52 mm (0.375 in.)
Installation: Inserted on rails between baffles, two per rail per space
Baffles spaced 298.45 mm (11.75 in.) on center
Overall Weight: 0.79 kg (1.75 lbs)

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Physical Measures

Dimensions: 2.46 m (96.75 in) wide by 2.41 m (94.875 in) long
Thickness: 0.22 m (8.75 in)
Weight: 16.1 kg (35.5 lbs)

Test Environment

Room Volume: 291.98 m³
Temperature: 21.1 °C ± 0.0 °C
Relative Humidity: 71.8 % ± 1.0 %
Barometric Pressure: 97.9 kPa

The total absorptive area (all exposed surfaces) of all sound-absorbing units was 13.36 m² (143.77 ft²).
The array of units covered 5.92 m² (63.74 ft²) of chamber floor surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of nine (9) sound-absorbing baffles suspended from an array of cables such that the bottom surface of the baffles is located approximately 1168.4 mm (46 in.) above the horizontal test surface. The baffles were arranged in a single row, horizontally spaced 298.45 mm (11.75 in.) on center. This approximates the mounting method of a typical ceiling baffle installation.

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Figure 1 - Specimen mounted in test chamber

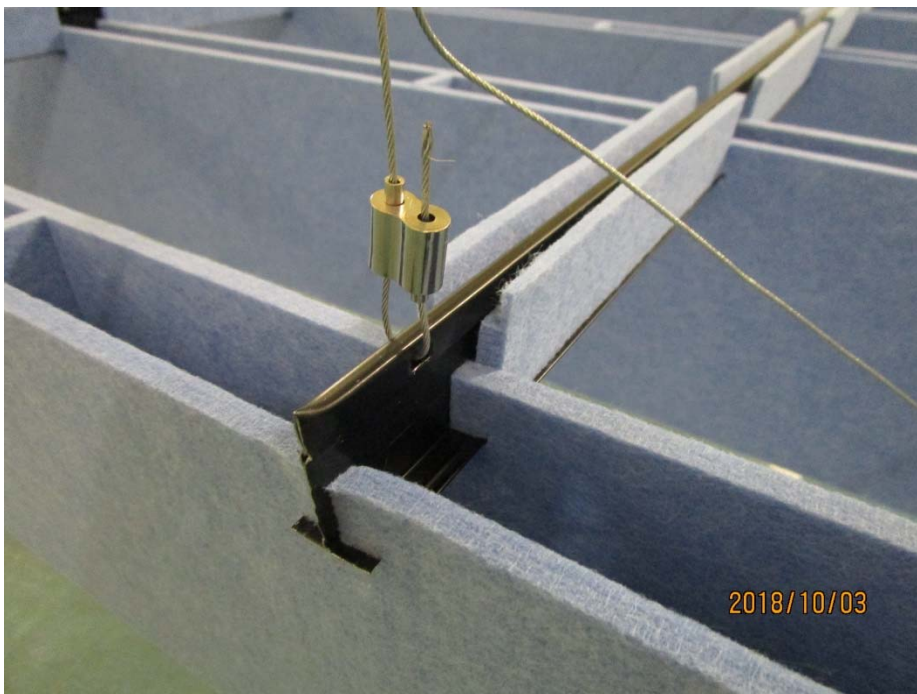


Figure 2 - Detail of specimen material, spacers, and mounting method

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TEST RESULTS

Note: There is currently no standardized method for calculating Absorption Coefficients from spaced object absorbers. The sound absorption performance of spaced object absorbers should not be compared directly with specimens tested as a single rectangular area (e.g. mounting types A, E, etc.).

For the purposes of this test report, a single “unit” refers to the combination of one baffle and its immediately adjacent spacers.

1/3 Octave Center Frequency (Hz)	Total Absorption		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
100	0.72	7.72	0.08	0.86
** 125	1.51	16.25	0.17	1.81
160	1.14	12.26	0.13	1.36
200	1.86	20.06	0.21	2.23
** 250	2.24	24.07	0.25	2.67
315	2.78	29.92	0.31	3.32
400	3.09	33.21	0.34	3.69
** 500	3.68	39.65	0.41	4.41
630	4.07	43.82	0.45	4.87
800	4.31	46.34	0.48	5.15
** 1000	5.18	55.79	0.58	6.20
1250	5.75	61.86	0.64	6.87
1600	6.48	69.72	0.72	7.75
** 2000	7.09	76.34	0.79	8.48
2500	7.71	82.99	0.86	9.22
3150	7.79	83.81	0.87	9.31
** 4000	7.93	85.35	0.88	9.48
5000	8.27	89.05	0.92	9.89

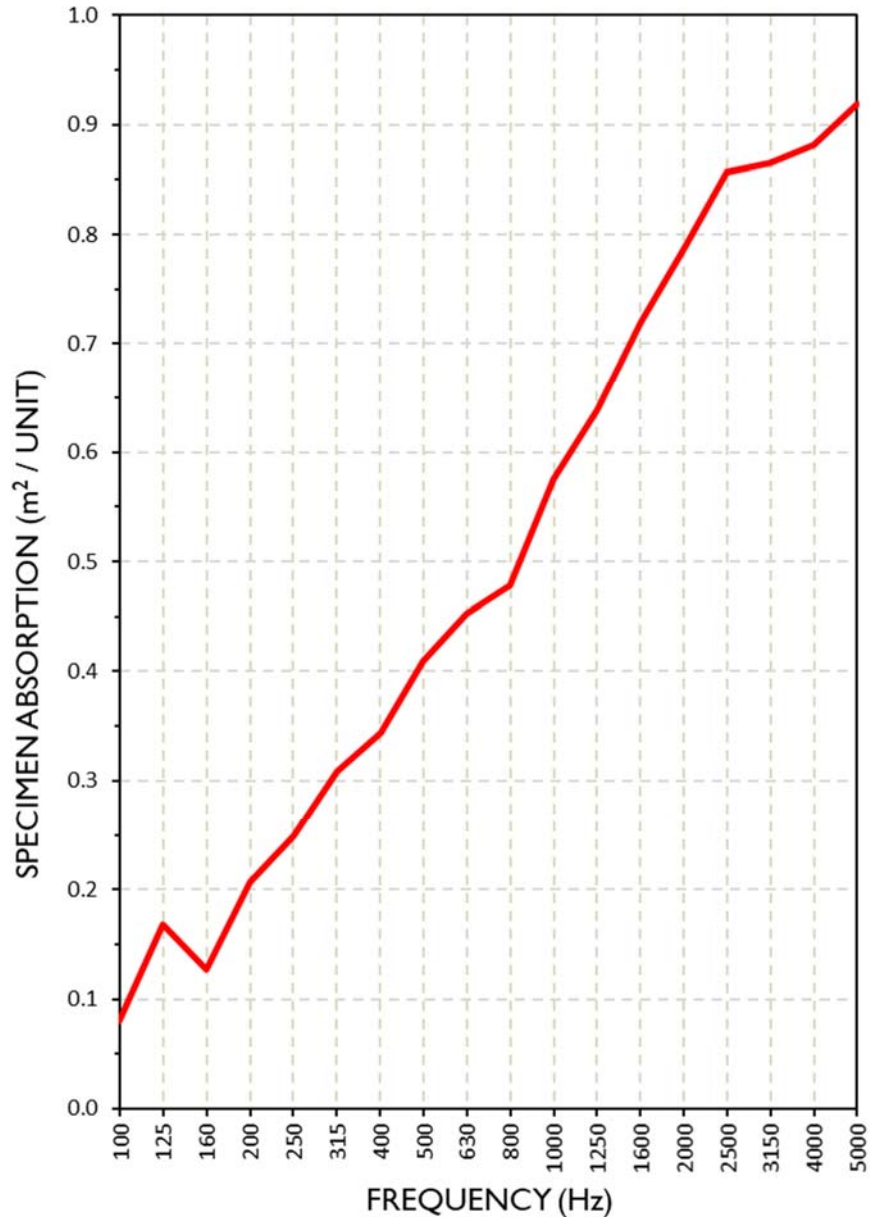
Tested by  Report by  Approved by 
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SOUND ABSORPTION REPORT
Ceiling Baffle system 2 in. (50 mm) Rombo/Nelio



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APPENDIX A: Extended Frequency Range Data

Specimen: Ceiling Baffle system 2 in. (50 mm) Rombo/Nelio (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-17, but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes.

1/3 Octave Band Center Frequency (Hz)	Total Absorption		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
31.5	-1.86	-20.05	-0.21	-2.23
40	-0.14	-1.46	-0.02	-0.16
50	0.84	9.01	0.09	1.00
63	-0.79	-8.46	-0.09	-0.94
80	0.36	3.91	0.04	0.43
100	0.72	7.72	0.08	0.86
125	1.51	16.25	0.17	1.81
160	1.14	12.26	0.13	1.36
200	1.86	20.06	0.21	2.23
250	2.24	24.07	0.25	2.67
315	2.78	29.92	0.31	3.32
400	3.09	33.21	0.34	3.69
500	3.68	39.65	0.41	4.41
630	4.07	43.82	0.45	4.87
800	4.31	46.34	0.48	5.15
1000	5.18	55.79	0.58	6.20
1250	5.75	61.86	0.64	6.87
1600	6.48	69.72	0.72	7.75
2000	7.09	76.34	0.79	8.48
2500	7.71	82.99	0.86	9.22
3150	7.79	83.81	0.87	9.31
4000	7.93	85.35	0.88	9.48
5000	8.27	89.05	0.92	9.89
6300	8.54	91.89	0.95	10.21
8000	8.73	93.93	0.97	10.44
10000	8.71	93.78	0.97	10.42
12500	9.49	102.13	1.05	11.35

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APPENDIX B: Instruments of Traceability

Specimen: Ceiling Baffle system 2 in. (50 mm) Rombo/Nelio (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 1	Type 3160-A-4/2	System 1	2018-08-09	2019-08-09
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2018-03-27	2019-03-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2018-08-06	2019-08-06
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	P97844	2018-02-03	2019-02-03

END

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Appendix C to ASTM C423 Sound Absorption Test

Non-standard calculation of equivalent NRC Rating and Absorption Coefficients from spaced absorbers.

At this time ASTM C423 does not provide a standard method for determining absorption coefficients of spaced object absorbers. Tests of a set of sound absorbing objects spaced apart from each other will yield higher absorption rates than a specimen joined together as a single patch (A-Mount or E-Mount). For this reason it is unfair to provide NRC or absorption coefficient ratings for specimens that consist of a spaced set of absorbers. Despite this, the architectural industry has expressed great demand for a simple "single number" rating for these treatments. Likewise, acoustical consultants desire equivalent absorption coefficient data for use in acoustical modeling programs. The following is an attempt to appease these demands until ASTM develops a standard method for calculation. Several alternate non-standard calculation methods are provided. Riverbank Acoustical Laboratories prefers method 1.

Method 1) Apparent Sound Absorption Coefficient calculated from total test surface area covered.

The total sound absorption yielded by the specimen is divided by the total surface area of the test surface covered by the suspended specimen, including intermediate spaces. The specimen rigging covered 5.92 m² (63.74 ft²) of horizontal test surface area. With an additional 298.45 mm (11.75 in.) of width to account for the space between these baffles and what would be the next baffle in a larger array, the area comes to 6.64 m² (71.49 ft²). Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This may be the most accurate method for comparing specimen arrays to ceiling tile products. In acoustical modeling applications, the apparent sound absorption coefficient data can be extrapolated across an entire horizontal surface or plane for approximation of specimen array performance (assuming specimen spacing is similar to that tested).

Method 2) Apparent Sound Absorption Coefficient calculated from total exposed surface area of specimen.

The total sound absorption yielded by the specimen is divided by the total surface area of all exposed specimen faces, as obtained from client CAD drawings (13.36 m² (143.77 ft²)). Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This method shows the actual absorption occurring at the exposed surfaces, but does not provide a fair comparison with materials mounted as a uniform patch (in A-mount or E-mount).

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Appendix D: Data Note: See full test report for details of mounting position, spacing and configuration as these parameters greatly affect sound absorption performance.

Specimen Absorption			Method 1	Method 2
Freq. (Hz)	Sabins	Sabins / Unit	Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area
31.5	-20.05	-2.23	-0.28	-0.14
40	-1.46	-0.16	-0.02	-0.01
50	9.01	1.00	0.13	0.06
63	-8.46	-0.94	-0.12	-0.06
80	3.91	0.43	0.05	0.03
100	7.72	0.86	0.11	0.05
125	16.25	1.81	0.23	0.11
160	12.26	1.36	0.17	0.09
200	20.06	2.23	0.28	0.14
250	24.07	2.67	0.34	0.17
315	29.92	3.32	0.42	0.21
400	33.21	3.69	0.47	0.23
500	39.65	4.41	0.56	0.28
630	43.82	4.87	0.62	0.30
800	46.34	5.15	0.66	0.32
1,000	55.79	6.20	0.79	0.39
1,250	61.86	6.87	0.88	0.43
1,600	69.72	7.75	0.99	0.49
2,000	76.34	8.48	1.08	0.53
2,500	82.99	9.22	1.18	0.58
3,150	83.81	9.31	1.19	0.58
4,000	85.35	9.48	1.21	0.59
5,000	89.05	9.89	1.26	0.62
6,300	91.89	10.21	1.30	0.64
8,000	93.93	10.44	1.33	0.65
10,000	93.78	10.42	1.33	0.65
12,500	102.13	11.35	1.45	0.71
Apparent NRC:			0.70	0.35
Apparent SAA:			0.69	0.34

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